

Session 3 - Tissues

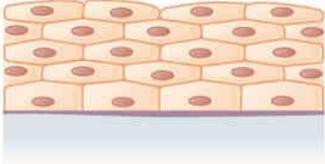
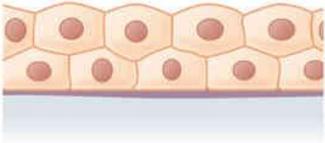
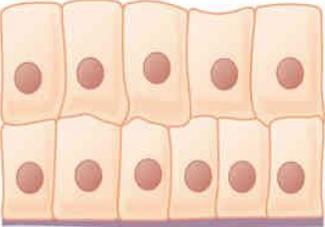
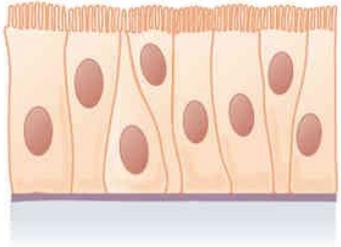
A & P I Lab students,

This week during the lab, you'll be learning about histology, the study of tissues. You'll remember that a tissue is a group of cells that are working together to perform a particular function. More specifically, you'll be learning about the four types of tissues found in the human body: epithelium tissue (also called epithelium), connective tissue, muscular tissue, and nervous tissue.

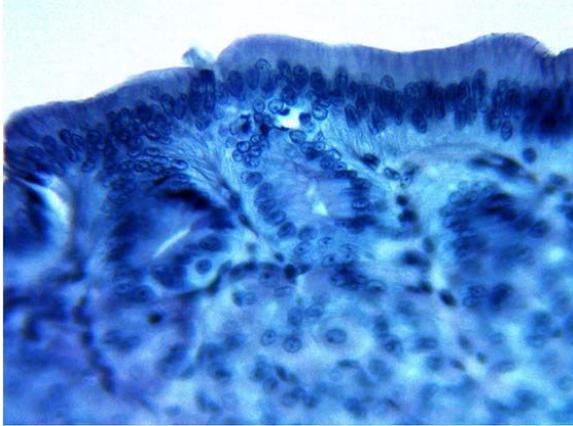
Exercise 1 - Histology of Epithelial Tissue

In Exercise 1, you'll be examining the histology of epithelial tissue. Epithelium and epithelial tissue are the same thing. Epithelial tissue consists of cells that are on the surface. In other words, there are no other cells on top of them. Not only are epithelial cells found on your skin, but they are found lining cavities and hollow organs in the body.

Epithelial tissue is categorized based on two features of the cells: the shape of the cells and how many layers of cells are in the tissue. There are three shapes of cells: squamous, cuboidal, and columnar. (Click on the following link to hear the pronunciation of squamous - <https://www.merriam-webster.com/dictionary/squamous>.) If the tissue consists of only one layer of cells, the tissue is referred to as simple. So, for instance, if the tissue is made of one layer of squamous cells, the tissue is called simple squamous epithelium. If there is more than one layer of squamous cells, the tissue is called stratified squamous epithelium. Some epithelial tissue falls outside of this pattern of naming the tissue. The epithelium lining the inside of the urinary bladder is called transitional epithelium because when the urinary bladder is empty, the cells of transitional epithelium look like stratified cuboidal cells but when the urinary bladder is full, the cells flatten out and the tissue looks like stratified squamous epithelium. Another type of epithelial tissue is pseudostratified columnar epithelium. The root word "pseudo" means "false." Pseudostratified columnar epithelial tissue consists of cells that *appear* to be stacked on top of each other, but in reality, each of the cells touch the bottom. (Pseudostratified columnar epithelium is often ciliated. For instance, the tissue lining the trachea (windpipe) is pseudostratified columnar epithelium and the cilia are used to move mucus upward to the pharynx (throat).

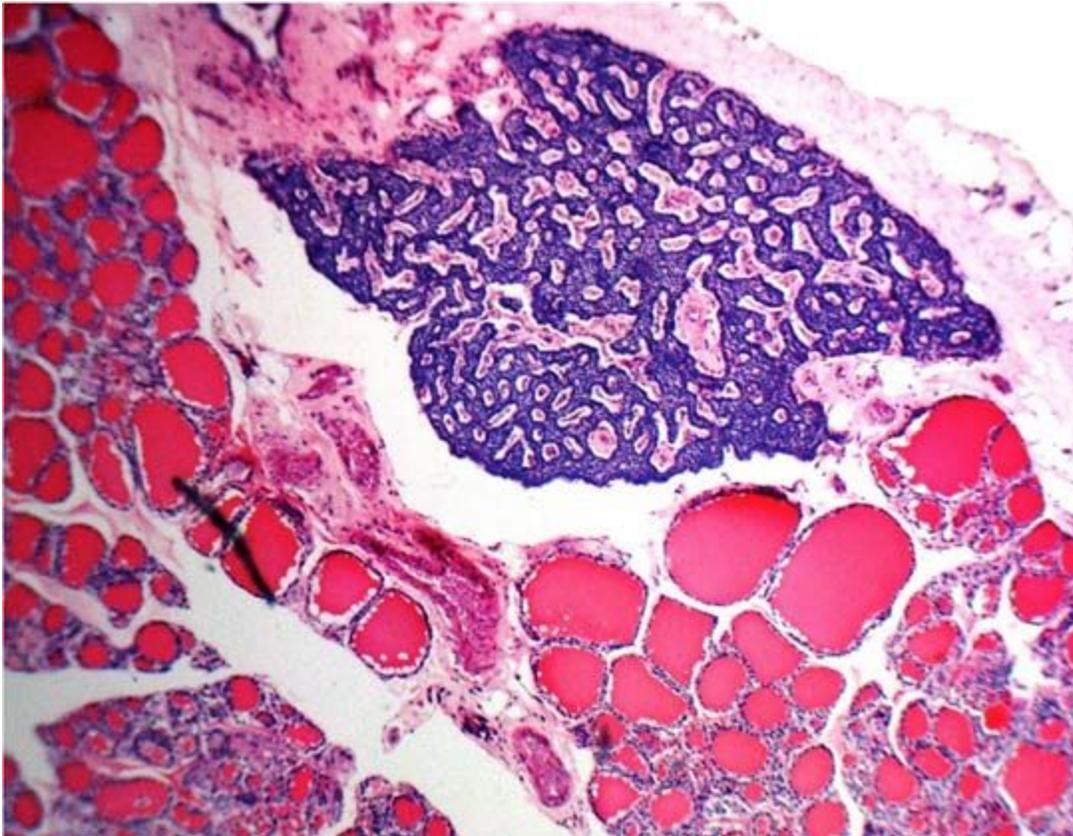
	Simple	Stratified	
Squamous	 <p>Simple squamous epithelium</p>	 <p>Stratified squamous epithelium</p>	
Cuboidal	 <p>Simple cuboidal epithelium</p>	 <p>Stratified cuboidal epithelium</p>	
Columnar	 <p>Simple columnar epithelium</p>	 <p>Stratified columnar epithelium</p>	<p>Pseudostratified</p>  <p>Pseudostratified columnar epithelium</p>

In Part 1, you'll be labeling the **simple columnar epithelial tissue** that lines the stomach. You will be looking for something that looks like this (below). Since this is simple columnar epithelial tissue, you'll be labeling the top layer of columnar shaped cells.



In Part 2, you'll be looking for cuboidal cells that line colloid (a solution). The cuboidal cells are follicular cells that surround the colloid. The red circles are the colloid. Your slide may not look exactly like this. Here is another photo showing cuboidal cells around follicles in thyroid tissue:

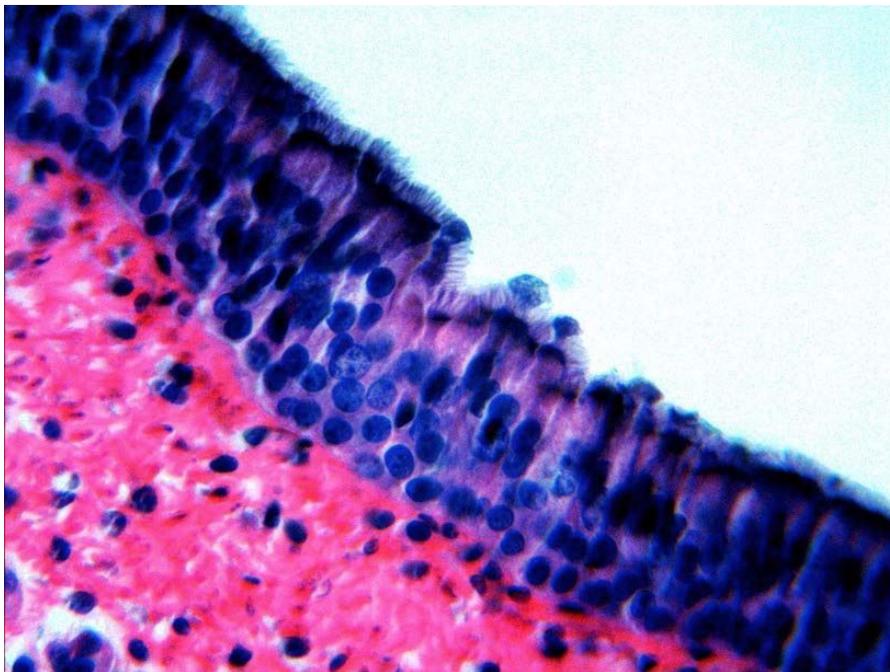
- https://www.apsubiology.org/anatomy/2010/2010_Exam_Reviews/Exam_5_Final_Review/thyroid%20gland02x.bmp



In Part 3, you'll be looking at simple squamous epithelial tissue of the lung. A photo that shows the tissue is in the HOL lesson.

In Part 4, you'll be looking at stratified squamous epithelium. Figure 13 in the lesson at the HOL site shows two kinds of stratified squamous epithelium: keratinized tissue (in Figure A) and non-keratinized (in Figure B). You'll be uploading a photo of each kind for Part 4. Keratin is a protein that certain cells produce that protects the cells from damage. Keratin is found in the cells of the upper layer of the epidermis of your skin, but is also found in your hair and nails.

In Part 5, you'll be examining Pseudostratified Ciliated Columnar Epithelium of the Trachea. You can see this type of tissue in the photo below:

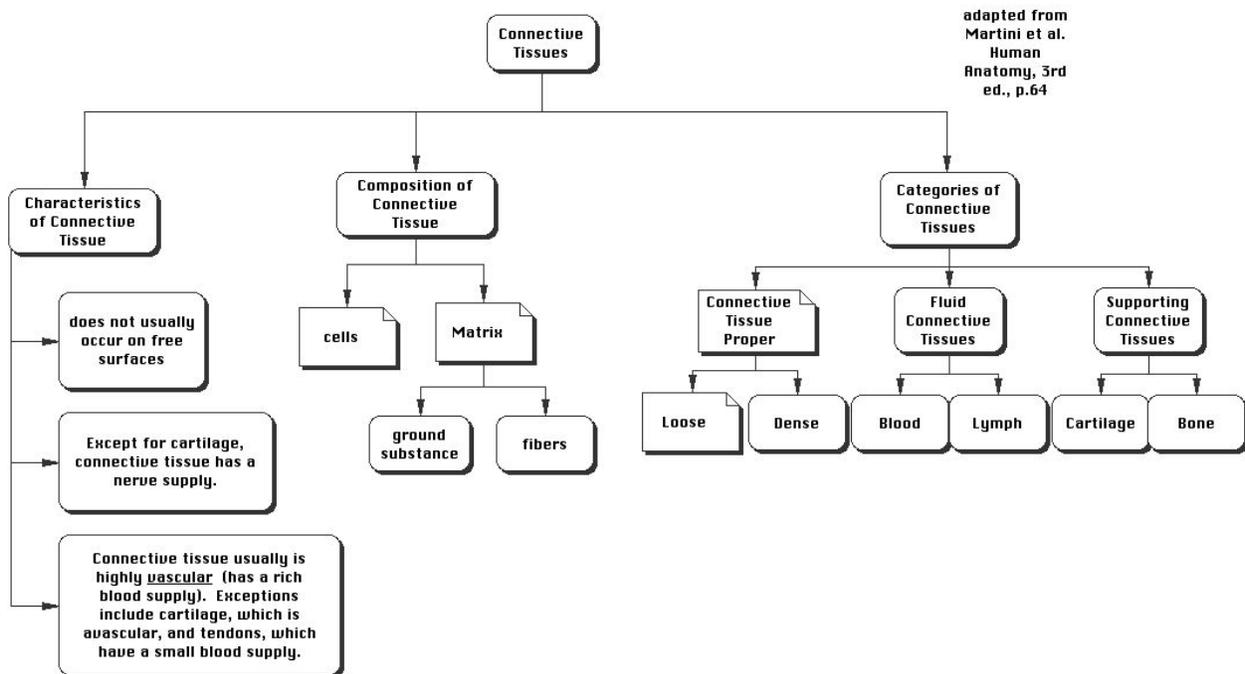


Part 6 asks you to identify a specialized secretory cell. In Part 6, you'll be looking at a variety of slides and then uploading a photo of only one of the slides of your choosing into Photo 7. **Make sure you upload only one slide. Again, it doesn't matter which slide you use.** The instructions ask you to label a "specialized secretory cell." You may be wondering which cells are the "specialized secretory cells." It's any cell of the tissue except for the epithelial tissue of the gland.

Exercise 2 - Histology of Connective Tissue

Connective tissue is tissue that contains cells that far apart from each other and between the cells is a “filler” called the extracellular matrix. The matrix is made of something called “ground substance” and fibers. The ground substance might be solid, as is the case with bone tissue, a liquid, as is the case with blood, semifluid, or something that is gel-like. There are three kinds of fibers: collagen fibers, elastic fibers, and reticular fibers. Collagen fibers are strong, but they are not stiff. This allows for tissue flexibility. Collagen fibers are found in most types of connective tissue, especially tendons, ligaments, bone, and cartilage. Elastic fibers are smaller in diameter than collagen fibers, and they branch to form a fibrous network. Elastic fibers can be stretched and because they are elastic, they return to their original shape. Elastic fibers are abundant in places like the skin, blood vessel walls, and lung tissue.

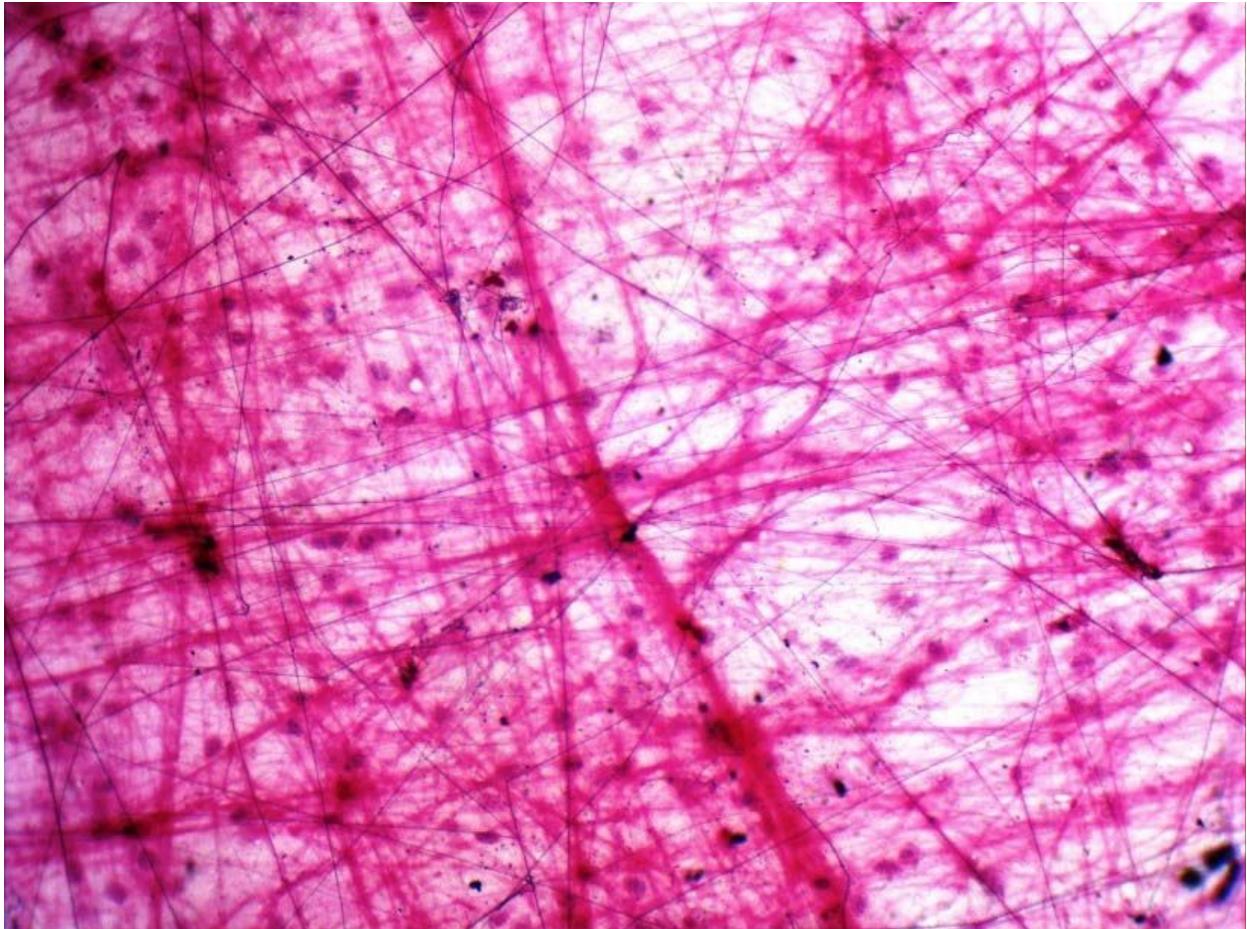
Here is a concept map that shows the characteristics of connective tissue, the composition of connective tissue, and categories of connective tissue. As you can see, there is quite a variety of different connective tissue in the human body. Some examples of connective tissue include fat (adipose tissue, which is a type of loose connective tissue), tendons (which are composed of dense connective tissue), blood, cartilage, and bone.



In Part 1 of Exercise 2, you’ll be examining loose and dense connective tissue. You’ll be taking photos of three different slides: connective tissue, loose; reticular connective tissue; and connective tissue, dense.

Upload the loose connective tissue into Photo 8 and label the **elastic fibers**, **collagen fibers**, and a **fibroblast nucleus**. You can see a photo of loose connective tissue below. The

collagen fibers are thicker than the elastic fibers. You can see a photo that labels the fibers here - <https://images.app.goo.gl/RXZhmANp3Aq3cULfA>

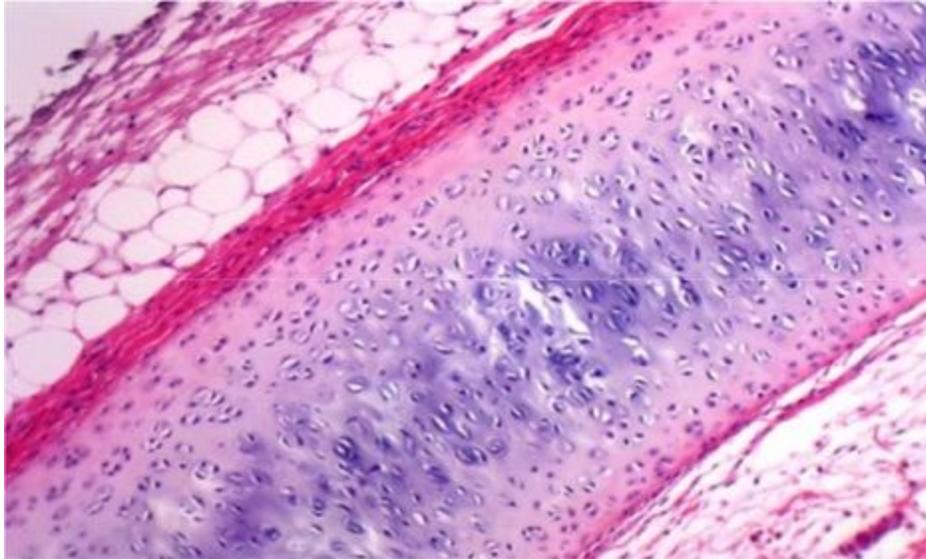


For photo 9 in Exercise 2, you are to upload a photo of reticular connective tissue and label the reticular fibers. Here's a slide that shows reticular fibers.

For photo 10 in Exercise 2, you are to upload a photo from the slide, **Connective Tissue, Dense**, and label a **fibroblast nuclei** and **collagen fibers**. You can see these structures in the top right photo of this image - <https://images.app.goo.gl/biVi61Ag9dofXKFK7>

For Part 2 of Exercise 2, you'll be examining adipose (fat) and supportive connective tissue (hyaline cartilage). Adipose cells are filled with fat and the nucleus is pushed off to the edge of the cell. Here's what the slide will look like (below). Here's a photo that shows adipose cells -

http://medcell.med.yale.edu/histology/connective_tissue_lab/white_adipocytes.php Here's a photo of hyaline cartilage - <https://images.app.goo.gl/NsX9zA4ZCHgLuMbjA>



In Part 3 of Exercise 2, the HOL site provides you with a photo of a type of connective tissue and you are supposed to figure out which type of connective tissue it is.

Exercise 3 - Muscle and Nerve Histology

There are three types of muscle tissue - skeletal muscle tissue, cardiac muscle tissue, and smooth muscle tissue. In Figure 15, there is a set of three photos. If you go to page 169 of your textbook, you can learn about the three different types of muscle tissue, in terms of their structure and location in the body. For this exercise, you are to figure out which type of muscle tissue are each of the three photos. You'll notice that in the bottom left-hand corner of each of the three photos there is a number 1, 2 or 3. In the Data Table (bottom right), indicate if Figure 15.1 is smooth, skeletal, or cardiac muscle tissue. Then type in the distinguishing features of that type of muscle tissue. In other words, indicate the feature of that type of muscle tissue that distinguishes it (makes it different) from the other two types of muscle tissue. Then do the same thing for the other Figures 15.2 and 15.3.

In step 4 of Exercise 3, there is a photo through the spinal cord, which contains nervous tissue. Two of the cell bodies are labeled. The instructions state, "Describe the other tissue that surrounds the cell bodies in the "Characteristics" column of **Data Table 3.**" This is probably confusing when they say "describe the other tissue." In order to answer this question, go to

page 171 of your textbook and read about nervous tissue. Let me help you with this question. In addition to a cell body, what are the two other parts of neurons? Also, nervous tissue consists of neurons and what other type of cell? (These cells are also called glial cells.)

I have made a PDF of this announcement and have attached it to this announcement so you download it and print it off, or open it up on your computer and use it while you proceed through the Histology lesson at the HOL site.

As always, if you have any questions, don't hesitate to email me (jmjohnson@ga.ccu.edu).

Mr. Johnson